

<div>Geometric Design Criteria</div> <div>Border Highway Extension-West (WA#7: César Chávez Highway Schematic Development)</div> <div>Route Studies, Environmental Documentation, & Preliminary Engineering Design</div>														
Geometric Element	Design Criteria													
	Main Lanes		Direct Connectors		Entrance/Exit Ramps		Frontage Roads [12]		Collector		Arterials		Figure or Paragraph	[1] [2] Page Number
	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum		
Roadway Classification	Urban Freeway		Freeway Connector		Freeway Ramp		Urban Frontage Road		Urban Collector		Urban Arterial		RDM; AASHTO	page 2-2; page 1-13
Level of Service (LOS) [3]	C	D	C	D	C	D	C	D	B	D	B	D	RDM; AASHTO	page 3-3, 3-61, 3-62, 3-68; page 85, 444, 470, 504
Design Speed	60 mph	50 mph	50 mph	30 mph	50 mph	30 mph	50 mph	30 mph	60 mph	30 mph	60 mph	30 mph	RDM Table 3-1; AASHTO	page 3-4, 3-61 3-68, 3-91; page 390, 422, 430, 444, 470, 503, 826
Horizontal Alignment														
Control Location	Roadway centerline		Outside edge/lane		Outside edge/lane		Outside edge/lane		Roadway centerline		Roadway centerline			
Design Stopping Sight Distance	570 ft	425 ft	425 ft	200 ft	425 ft	200 ft	425 ft	200 ft	570 ft	200 ft	570 ft	200 ft	RDM Table 2-1; AASHTO Exhibit 3-1	page 2-7; page 112
Usual Min. Radius	2210 ft	1055 ft	1055 ft	275 ft	1055 ft	275 ft	1055 ft	275 ft	2210 ft	250 ft	2210 ft	250 ft	RDM Table 2-3, 2-5, 2-6, 3-21; AASHTO Exhibit 3-15	page 2-12, 2-19, 2-20, 2-21, 3-94; page 146-147
Absolute Min. Radius	1340 ft	835 ft	835 ft	230 ft	835 ft	230 ft	835 ft	230 ft	1330 ft	230 ft	1330 ft	230 ft	RDM Table 2-3, 2-5, 2-6; AASHTO Exhibit 3-15	page 2-12, 2-19, 2-20, 2-21; page 146-147
Max. Superelevation Rate	e(max) = 6%		e(max) = 6%		e(max) = 6%		e(max) = 6%		e(max) = 4%		e(max) = 4%		RDM Table 2-3, 2-6; AASHTO	page 2-12, 2-20, 2-21; page 144-145, 147, 421, 431, 446, 471, 505
Relative Gradient (%) For Superelevation Transition	0.45%	0.50%	0.50%	0.66%	0.50%	0.66%	0.50%	0.66%	0.45%	0.66%	0.45%	0.66%	RDM Table 2-8; AASHTO Exhibit 3-30	page 2-25, 2-26; page 177
Max. Degree of Deflection w/o Horizontal Curve	0°15'0"	0°15'0"	0°15'0"	0°30'0"	0°15'0"	0°30'0"	0°15'0"	0°30'0"	0°15'0"	0°30'0"	0°15'0"	0°30'0"	RDM Chpt 2 para 1 (below Table 2-4)	page 2-14
Vertical Alignment														
Control Location	Roadway centerline		Outside edge/lane		Outside edge/lane		Outside edge/lane		Roadway centerline		Roadway centerline			
Type of Terrain	Rolling terrain		Rolling terrain		Rolling terrain		Rolling terrain		Rolling terrain		Rolling terrain			
Maximum Gradient	4.00%	5.00%	4.00%	5.00%	4.00%	5.00%	8.00%	11.00%	7.00%	11.00%	6.00%	9.00%	RDM Table 2-9; AASHTO Exhibit 6-4, 6-8, 7-2, 8-1	page 2-34, 3-96; page 423, 432, 446, 472, 506
Minimum Gradient [4] [5]	0.50%	0.35%	0.50%	0.35%	0.50%	0.35%	0.35%	0.35%	0.35%	0.35%	0.35%	0.35%	RDM; AASHTO	page 2-34; page 236
Crest Curve Min. K-Value [5]	151	84	84	19	84	19	84	19	151	19	151	19	RDM Fig. 2-7; AASHTO Exhibit 3-72	page 2-37; page 272
Sag Curve Min. K-Value [5]	136	96	96	37	96	37	96	37	136	37	136	37	RDM Fig. 2-8; AASHTO Exhibit 3-75	page 2-38; page 277
Max. Algebraic Grade Break w/o Vertical Curve	0.5% or less	0.5% or less	0.5% or less	1.0% or less	0.5% or less	1.0% or less	0.5% or less	1.0% or less	0.5% or less	1.0% or less	0.5% or less	1.0% or less	RDM	page 2-38 and 2-39
Vertical Clearance														
Under/Overpass Roadway [9]	16.5 ft	14.5 ft	16.5 ft	14.5 ft	16.5 ft	14.5 ft	16.5 ft	14.5 ft	16.5 ft	14.5 ft	16.5 ft	14.5 ft	RDM Table 3-1; AASHTO	page 3-4; page 427, 436, 447, 472, 506-507, 763-764
Sign Bridges	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	17.5 ft	TMUTDC Sect 2A.18; RDM; AASHTO	page 2A-12; page 3-64; page 506-507
Over Railroad	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	RDM Figure 3-16	page 3-65
Cross Sectional Elements	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum		
Lane Widths														
Thru Lanes [10] [11]	12 ft	12 ft	14 ft (1 lane)		14 ft (uncurbed)		12 ft	10 ft	12 ft	10 ft	12 ft	11 ft	RDM Table 3-18, Table 3-1; AASHTO	page 3-66, 3-4; 311-312
Turning Lanes	N/A	N/A	N/A		N/A		12 ft	10 ft	12 ft	10 ft	12 ft	11 ft	RDM Table 3-1; AASHTO	page 3-4; 311-312
Usable Shoulder Widths														
Inside [6]	4 ft - 4 Lane Divided: 10 ft - 6 Lane Divided		2 ft roadway; 4 ft structure		2 ft roadway; 4 ft structure		Curb/None		Curb/None		Curb/None		RDM Table 3-18; AASHTO Exhibit 6-5, 7-3	page 3-66; 314, 425, 448, 504-505
Outside [7]	10 ft		8 ft		8 ft 6 ft		Curb/None		Curb/None		Curb/None		RDM Table 3-18; AASHTO Exhibit 6-5, 7-3	page 3-66; 314, 425, 448, 504-505
Cross Slope (Lane & Shld.) [8]	2.00%		2.00%		2.00%		2.00%		2.00%		2.00%		RDM; AASHTO	page 2-40 and 2-41; 421, 431, 446, 472, 504-505
Concrete Pvmt. Thickness														
Roadway	To Be Determined		To Be Determined		To Be Determined		To Be Determined		To Be Determined		To Be Determined			
Intersection	To Be Determined		To Be Determined		To Be Determined		To Be Determined		To Be Determined		To Be Determined			
Monolithic Curbs														
Inside	none		none		none		yes		yes - Urban		yes			
Outside	none		none		none		yes		yes - Urban		yes			
Curb Offset to Near Lane														
Inside	N/A		N/A		N/A N/A		2 ft	1 ft	2 ft	1 ft	2 ft	1 ft	RDM Table 3-1	page 3-4
Outside	N/A		N/A		N/A N/A		2 ft	1 ft	2 ft	1 ft	2 ft	1 ft	RDM Table 3-1	page 3-4
Side Slope Rates														
Within Clear Zone	6 to 1	4 to 1	6 to 1	4 to 1	6 to 1	4 to 1	6 to 1	4 to 1	6 to 1	4 to 1	6 to 1	4 to 1	RDM Table 2-10; AASHTO	page 2-42; page 512
Outside Clear Zone	4 to 1	3 to 1	4 to 1	3 to 1	4 to 1	3 to 1	4 to 1	3 to 1	4 to 1	3 to 1	4 to 1	3 to 1	RDM Table 2-10; AASHTO	page 2-42; page 512
Clear Zone Width	30 ft		16 ft		16 ft		30' >= 50 mph 3' <= 45mph	20' >= 50 mph 1.5' <= 45mph	30' >= 50 mph 3' <= 45mph	20' >= 50 mph 1.5' <= 45mph	30' >= 50 mph 3' <= 45mph	20' >= 50 mph 1.5' <= 45mph	RDM Table 2-11	page 2-52
Border Width	N/A		N/A		N/A		20 ft	15 ft	20 ft	15 ft	20 ft	15 ft	RDM Table 3-1; AASHTO	page 3-4; page 438, 463, 479
Sidewalk Width	N/A		N/A		N/A		6-8 ft	5 ft	6-8 ft	5 ft	6-8 ft	5 ft	RDM Table 3-1; AASHTO	page 3-4; page 436
Intersections														
Sight Distance	N/A		N/A		N/A		555 ft	335 ft	665 ft	335 ft	665 ft	335 ft	AASHTO Exhibit 9-55	page 661
Corner Radii														
Streets														
Design Vehicle	WB-62	WB-62	N/A		N/A		WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	RDM, AASHTO	page 7-14, 7-27; 18
Driveways														
Design Vehicle	N/A	N/A	N/A		N/A		Passenger car	Passenger car	Passenger car	Passenger car	Passenger car	Passenger car		

Notes:

[1] RDM = *Roadway Design Manual*, Revised May 2010, Texas Department of Transportation.

[2] AASHTO = *A Policy on Geometric Design of Highways and Streets*, 2004, American Association of State Highway and Transportation Officials.

[3] The Highway Capacity Manual contains no recommendations for the applicability of the LOS in highway design. Choice of an appropriate LOS for design is left to the highway engineer.

[4] If 0.0% gradient is used, pavement should be adequately crowned to drain the water laterally.

[5] Drainage Threshold Maximum value for k=167 for Crest and Sag Vertical Curves (only if the curve is sharp enough so that minimum grade of 0.30% is reached at a point about 50 ft.)

[6] 4' inside shoulder if on a bridge, retaining wall, or curbed roadway.

[7] Desirable values should be used if over 10% trucks on ramp.

[8] 2.5% on outside lanes, if 3 or more lanes. The increase in slope in the outer lanes should be at least 0.5% greater than the inside lanes.

[9] Exceptional cases near as practical to 16'-6" but never less than 14'-6". Existing structures that provide at least 14 ft. may be retained.

[10] In highly restricted locations or locations with few trucks and speeds less than equal to 40 mph, 10 ft. permissible.

[11] In industrial areas 12 ft. usual, and 11 ft. minimum for restricted R.O.W. conditions. In non-industrial areas, 10 ft. minimum.

[12] Turnaround design criteria=RDM Figure 3-38. Pavement width 24' desirable (20' Turnaround lane plus 2' curb offsets), 18' minimum (16' Turnaround lane plus 1' curb offsets).